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ABSTRACT

The SimulaR, a portable tabletop instructional simulator and response recording device has been designed to aid research in development of programed instruction and is scheduled for a field test involving instructional simulation of remedial reading. Major components consist of a two channel audio playback device, a visual component incorporating the projection of slides or loopstrips, a cassette recorder, and an automatically triggered 16 millimeter camera. Program capabilities for research purposes are standardization of presentation, reliable component synchronization, and simplicity of program changes. Major research and testing uses of the SimulaR might include institutional screening for cognitive and psychomotor responses, or the correlation of photographic and audio presentation/collection capabilities to sample attention span evidences. (MC)

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AND YOUTH

SIMULATION AND RECORDING DEVICE
FOR
RESEARCH IN PROGRAMMED INSTRUCTION
(SimulaR)

Paper No. 5

THE PROSPECTUS SERIES

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SIMULATION AND RECORDING DEVICE
FOR
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SimulaR
-- Simulation and Recording Device
for Research in Programmed Instruction --

Research concerned with the development of programmed instruction commonly requires devices and procedures which can present instructional stimuli on a rigorously controlled schedule and in a standardized format while making precise observations of student behavior. To augment the research capabilities of the Learning Systems Institute, the Human Learning Research Institute, and the USOE/MSU Instructional Materials Center for Handicapped Children and Youth, the SimulaR device has been designed and scheduled for construction. The first field of application is planned for Oakland County Intermediate School District and will be applied to an instructional simulation of remedial reading under the direction of Dr. Loyal Joos, Director of Research for Oakland Schools.

The SimulaR, named for its unique capabilities as both an instructional problem simulator and as a pupil response recording device, is essentially a portable table-top teaching station with audio and visual display plus audio and visual recording facility. The entire unit functions as a single system programmed by a multi-channel tape cartridge. The control cartridge is programmed with all aural data to be presented to the student plus the magnetic command cues which cause the other components to turn on and off at pre-determined moments in the presentation.

MAJOR COMPONENTS

Control tape playback. The primary component is a cartridge-type audio playback device. There are two channels on the control tape, thus the playback "plays" these two channels. The A channel is audio information fed through a small speaker (presented at a pleasant volume level approximately 12 inches from the student's ear). The B channel consists of "beeps" of (1) high: 20kHz, (2) medium: 500Hz, and (3) low: 20Hz tones.

These tones are monitored by a selective filter sub-component which causes the tones to selectively actuate on-off and frame-advance switches for the other major components.

Visual presentation. The visual presentation component is a slide or single-frame loop-strip projector which presents pictures on a rear-projection viewing screen (8' x 10") immediately in front of the student. The equipment options are (1) a Carousel-type 35mm projector or (2) an Adslide 16mm loop projector. The 35mm slides allow maximum flexibility in program modification and lower equipment cost, but limits the display to 80 frames. The 16mm frame size allows the use of very inexpensive color presentations (up to 500 frames) of adequate clarity for easy viewing (clarity, in terms of contrast, definition, and resolution would be somewhat better than the best television picture of the same size). The visual presentation material is in the form of either an endless loop of film or a repeating cartridge load of slides, automatically advanced by signals from the control tape.

Sound recording. A cassette-type recorder is fed by a microphone mounted near the viewing screen. The recorder is locked in its "record" mode, as far as the mechanical functions are concerned, but it actually

records only those periods of time for which the control tape turns it on. The first impulse from the control tape electronically flips a relay to "on," closing the circuit which drives the recorder's motor and electronics; the next impulse flips the relay back to "off." Thus, the collection of aural material is only that which the design of the experiment requires from each subject. This feature is extremely important for highly efficient data analysis. A separate, reusable cassette-cartridge is used for each subject.

Color photography. A 16mm camera, operating in single-frame mode, is triggered by the control tape. As in the aural data collecting, only those moments of student response which the experimenter requires to be photographed will be collected. The camera is operated by a solenoid which is activated by a special signal on the control tape. The minimum interval between photographs is .5 seconds. One loading of the camera will provide coverage for 50 to 100 subjects, assuming that between 40 and 80 pictures are required of each student. The 4,000 color frames will cost less than \$15 for film and processing.

PROGRAM CAPABILITIES

The basic SimulaR is not highly versatile as an instructional presentation device. It has no program branching capabilities nor does it allow for any instructional program individualization. (For many important research problems this is less a limitation than an advantage.) The length of an instructional or testing experience can be up to one hour in length. The length, once programmed, will be constant for all students, since even silent periods are a function of a designated length of silent

tape. The visual presentation can consist of up to 120 frames, including one opaque frame for each 'off' phase of the visual component. (The projector is actually on at all times, and turns 'off' only when the opaque frame in the sequence blacks out the screen.)

Once the program has been started by the student, it continues without interruption to the end. When completed, the control tape and visual presentation material are automatically recycled to the start of the program and remain in a "ready" position. With the insertion of a new recording cassette, SimulaR is completely operational for the next student. Personnel time for monitoring and supervising the program is reduced to an optimal or minimal level.

Full synchronization of all four major components is highly reliable; it is assured by the "locked in" nature of the control program tape.

Changes in the visual program, when the "Carousel" option is installed, requires simple replacement or rearrangement of slides in the rotary cartridge. If the "Adslide" option is used, these changes require a reprocessing of the film strip from a spliced-up master. Changes in the aural program are also quite simple, requiring splicing the master tape and re-dubbing of the control audio cartridge (can be done on any of several, fairly common educational-use recorders, such as the Roberts 1725 or Sony TC-8).

Changing the control cues is a task similar to changing the aural material.

PHYSICAL DESCRIPTION

Since SimulaR will be used with students of all ages (and sizes), it is a table-top unit which can be set on a table of the proper height for the particular students to be tested or instructed. The housing is shaped and sized like a small luggage trunk standing on end: higher than deep or wide, and deeper than wide. The 12 inches of table space closest to the student's chair is left free as a writing or work space for the student. The viewing screen appendage to the main housing constitutes the back boundary of the work space. This viewing screen appendage is an enclosed sub-housing (like a small television set) attached to the front of the main housing.

The main housing holds all the equipment. No controls or wires are exposed. (The only exceptions are a master switch on the rear -- so only the informed operator is able to use it -- and a "go" button near the projector screen.) Extended forward from the top of the main housing is a pipe-frame loop from which hangs a curtain. The curtain falls to table height and can be pulled around the student as an isolation/privacy screen.

A single 110 volt power cord provides power for all components. Service access and cartridge loading-unloading is accomplished by opening a hinged panel on either side of the main housing.

EXAMPLE PROBLEMS

Although the display functions of SimulaR can be used as an automated "teaching station" for individualized instruction, the major uses will be in research and testing.

Testing. A wide variety of highly standardized test situations can be set up on the SimulaR. For example, an institutional screening program which samples cognitive and psychomotor responses can be presented and monitored with the photographic and recording capabilities of the SimulaR.

Research. A typical use in programmed instruction research would be to use the photographic capability to sample attention span evidences, latency of response and the accuracy of response to manipulative instructions. At the same time the audio presentation and collection capabilities could be used to "interview" about strategies of the learner, confusion elements in the instructions, and the like.